

REMARKS

A. Introduction

Claims 2-7, 9-10, 12, 13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 were pending in the application at the time of the Office Action, with claims 43-84, 86, 88, 90, 92, 94, 96, 98, 100, 102 and 104 having been previously withdrawn. Claims 2-7, 9-10, 12, 13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 were rejected as being obvious over cited art. By this response applicant has amended claims 2, 19-21, 23-25, 34, 35, 61, and 65. As such, claims 2-7, 9-10, 12, 13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 are presented for the Examiner's consideration in light of the following remarks.

B. Proposed Claim Amendments

Applicant has herein amended claims 2, 19-21, 23-25, 34, 35, 61, and 65 to further clarify, more clearly define, and/or broaden the claimed inventions to expedite receiving a notice of allowance. For example, independent claim 2 has been amended to clarify that the sum of the phase difference $2\pi\{\phi_1(\lambda) + \phi_{\Delta L}(\lambda) + \phi_2(\lambda)\}$ "is set at a constant value regardless of wavelength." Other clarifying amendments have also been made to various claims to remedy various formalities.

The amendments to the claims are supported in the application at least by Figures 1 and 3 and the corresponding discussion in the specification. In view of the foregoing discussion, applicant submits that the amendments to the claims do not introduce new matter and entry thereof is respectfully requested.

C. Foreign Language References

As a preliminary matter, Applicant notes that the Office Action has relied on two Japanese language references (Japanese Patent No. 05061077 to Jinguji et al. [*“Jinguji”*] in view of Japanese Patent No. 08122545 to Arai et al. [*“Arai”*]) in rejecting the claims. However, an English translation has been published only of the title and abstract of these two Japanese references. Applicant further notes that the Office Action has failed to provide a full-text English translation of the underlying documents.

As stated in the MPEP, “[c]itation of and reliance upon an abstract without citation of and reliance upon the underlying scientific document is generally inappropriate where both the abstract and the underlying document are prior art. . . . If the document is in a language other than English and the examiner seeks to rely on that document, a translation must be obtained so that the record is clear as to the precise facts the examiner is relying upon in support of the rejection.” MPEP § 706.02(II), *emphasis added*.

The MPEP carves out an exception to this, stating that in limited circumstances the examiner may make a rejection in an Office Action based on the English language abstract only without relying on the rest of the reference. However, when doing so, “the evidence relied upon is the facts contained in the abstract, not additional facts that may be contained in the underlying full text document.” *id*.

In the sole rejection of the claims, the Office Action simply makes general assertions regarding the aforementioned Japanese references and the only portion specifically cited is “paragraph 0028” of *Jinguji*. Yet paragraph 0028 of *Jinguji* is not a portion of the English language abstract, but instead is a portion of the *Jinguji* reference that is only in the Japanese

language. As such, without a corresponding English translation, Applicant submits that the Office Action has committed clear error in citing the Japanese references in the rejection.

Nonetheless, regarding *Jinguji* and *Arai*, Applicant has obtained English translations of small portions thereof in support of the arguments set forth below and is submitting those translated portions concurrently in an Information Disclosure Statement (IDS). Applicant requests that an English translation of the full text documents of *Jinguji* and *Arai* be supplied by the Examiner should the Examiner elect to rely on *Jinguji* and *Arai* for more than that which is disclosed in the abstract thereof.

C. Rejections based on 35 USC § 103

Pages 2 and 3 of the Office Action reject claims 2-7, 9-10, 12-13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 under 35 USC § 103(a) as being unpatentable over *Jinguji* in view of *Arai*. In addition to the inappropriateness of the rejection based on references that are only published in the Japanese language, as discussed above, Applicant respectfully submits that a *prima facie* case of obviousness has not been established. Of the rejected claims, claim 2 is the sole independent claim.

Independent claim 2 recites that “at least one of said first optical multi/demultiplexing device and said second optical multi/demultiplexing device is a phase generating coupler, which produces a wavelength-dependent phase difference”, and “assuming that λ is the wavelength, $2\pi\phi_1(\lambda)$ is the phase produced by the first optical multi/demultiplexing device, $2\pi\phi_{\Delta 1}(\lambda)$ is the phase difference of the optical delay line with an optical path length difference of ΔL , and $2\pi\phi_2(\lambda)$ is the phase produced by the second optical multi/demultiplexing device, the sum of the phase difference $2\pi\{\phi_1(\lambda) + \phi_{\Delta 1}(\lambda) + \phi_2(\lambda)\}$ is set at a constant value regardless of wavelength.”

The Office Action alleges that “Jinguji et al. teaches reducing the wavelength dependence of the output intensity of an interferometric optical switch (IOS) by compensating the wavelength dependence of the phase difference caused by arm waveguides included in a Mach-Zehnder interferometer (MZI) using the wavelength dependence of an optical multiplexer/demultiplexer (MUX/DEMUX),” and cites to paragraph 0028 of *Jinguji* in support of the allegations. The Office Action concedes that *Jinguji* fails to disclose “explicitly teach[ing] using the wavelength dependence of the output phase difference in optical MUX/DEMUX means included in an MZI device,” but further alleges that doing so “is conventionally known in the art,” and cites to *Arai* in support.

Applicant notes, as discussed above, that the two cited references, *Jinguji* and *Arai*, are Japanese language references with only the titles and abstracts having been published in the English language. As further discussed above, citing to the body of these foreign language references is clearly improper without providing an English translation of the references. This fact alone demonstrates that the Office Action has failed to establish a *prima facie* case of obviousness regarding the rejected claims.

Furthermore, the Office Action is deficient for other reasons. For example, in the rejection, the Office Action has failed to even assert, let alone explain how many of the claim limitations are allegedly taught by the cited references. For example, the Office Action fails to even address the following limitations of claim 2:

- a first optical multi/demultiplexing device;
- an optical delay line including two optical waveguides connected to said first optical multi/demultiplexing device;
- a second optical multi/demultiplexing device connected to said optical delay line;
- one or more input waveguides connected to said first optical multi/demultiplexing device;

- one or more output waveguides connected to said second optical multi/demultiplexing device;
- a phase shifter installed in said optical delay line;
- at least one of said first optical multi/demultiplexing device and said second optical multi/demultiplexing device is a phase generating coupler which produces a wavelength-dependent phase difference; and
- the sum of the phase difference $2\pi\{\phi_1(\lambda) + \phi_{\Delta L}(\lambda) + \phi_2(\lambda)\}$ is set at a constant value regardless of wavelength.

As such, the Applicant is left to guess as to how the cited references allegedly disclose each of these claim elements.

In addition, the interferometer optical switch disclosed in *Jinguji* appears to employ a number of 3dB wavelength insensitive couplers (WINC's), each composed of an asymmetric Mach-Zehnder optical interferometer with subphase shifters. WINCs are used as a first optical MUX/DEMUX 22 and a second optical MUX/DEMUX 23, and they are placed point symmetric with respect to a rotating center of the interferometric optical switch.

The wavelength dependence of the optical MUX/DEMUX in *Jinguji* denotes the wavelength dependence of the coupling ratio of the optical MUX/DEMUX. This is consistent with the state of the art at the time of *Jinguji*, as operation by use of a phase output from an optical MUX/DEMUX was unknown at the time of the *Jinguji* application. Furthermore, *Jinguji* never discloses any operational advantage for suggesting the phase generating coupler of the present invention.

In fact, by arranging two optical MUX/DEMUX 22 and 23 in a point symmetrical configuration, no phase will be generated by the MUX/DEMUX. Paragraphs 0045 to 0048 of *Jinguji* discloses that the interferometric optical switch therein is required to be optically point approximately symmetrical about a central point. Additionally, *Jinguji* discloses that arrangements such as shown in Figures 5 and 6 therein could not obtain any switch operation

with small wavelength dependence. As such, *Jinguji* does not disclose or suggest “the sum of the phase difference $2\pi\{\phi_1(\lambda) + \phi_{\Delta_1}(\lambda) + \phi_2(\lambda)\}$ is set at a constant value regardless of wavelength,” as recited in amended claim 2.

Furthermore, *Jinguji* also fails to teach or suggest “a phase generating coupler which produces a wavelength-dependent phase difference,” as recited in claim 2.

Arai fails to cure the deficiencies of *Jinguji*, discussed above. Figure 10 of *Arai* discloses a Mach-Zhender waveguide type optical multiplexer/demultiplexer having divided regions 1 to 3, electric-amplitudes and phases in each of the regions. The Mach-Zhender waveguide type optical multiplexer/demultiplexer of *Arai* provides two waveguides that includes an upper waveguide (i.e. a port connecting sub-waveguides 68, 71 and 63) and a lower waveguide (i.e. a port connecting sub-waveguides 61, 72, 75 and 62). In each of the regions 1 to 3, relative phases of the upper waveguide with respect to the lower waveguide are disclosed by *Arai* as follows. The relative phases are $\exp[-j(\theta_1 - \theta_2)]$ in region 1, $\exp[-j\beta(\lambda) - \Delta L_2]$ in region 2, and $\exp[j(\theta_1 - \theta_2)]$ in region 3, (see Fig. 4 of *Arai*). Accordingly, the summation of the phase of the regions 1 to 3 turns out to be $\beta(\lambda)\Delta L_2$ because $\exp\{-j[(\theta_1 - \theta_2) + \beta(\lambda)\Delta L_2 - (\theta_1 - \theta_2)]\} = \exp[-j\beta(\lambda)\Delta L_2]$. As shown in Figure 10, the phases of the optical MUX/DEMUX in the two regions 1 and 3 are canceled out by arranging the WINCs with point symmetry. As noted above, this is simply the same thing that *Jinguji* discloses. Because of this, contrary to the assertion by the Office Action, *Arai* does not disclose or suggest “using the wavelength dependence of the output phase difference in optical MUX/DEMUX means included in an MZI device.”

In light of the above, similar to *Jinguji*, *Arai* also does not disclose or suggest “the sum of the phase difference $2\pi\{\phi_1(\lambda) + \phi_{\Delta_1}(\lambda) + \phi_2(\lambda)\}$ is set at a constant value regardless of

wavelength,” as recited in amended claim 2 or “a phase generating coupler which produces a wavelength-dependent phase difference,” as recited in claim 2.

Because *Jinguji* and *Arai* both fail, individually and collectively, to disclose various elements of the rejected claim 2, the Office Action has failed to establish a *prima facie* case of obviousness with respect to claim 2 based on the allegedly obvious combination of *Jinguji* and *Arai*. Accordingly, Applicant respectfully requests that the obviousness rejection with respect to claim 2 be withdrawn

Claims 3-7, 9-10, 12-13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 depend from claim 2 and thus incorporate the limitations thereof. As such, applicant submits that claims 3-7, 9-10, 12-13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 are distinguished over the cited art for at least the same reasons as discussed above with regard to claim 2. Accordingly, Applicant respectfully requests that the obviousness rejection with respect to claims 3-7, 9-10, 12-13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 also be withdrawn.

C. Conclusion

Applicant notes that this response does not discuss every reason why the claims of the present application are distinguished over the cited art. Most notably, applicant submits that many if not all of the dependent claims are independently distinguishable over the cited art. Applicant has merely submitted those arguments which it considers sufficient to clearly distinguish the claims over the cited art.

In view of the foregoing, applicant respectfully requests the Examiner's reconsideration and allowance of claims 2-7, 9, 10, 12, 13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101 and 103 as amended and presented herein.

In the event there remains any impediment to allowance of the claims which could be clarified in a telephonic interview, the Examiner is respectfully requested to initiate such an interview with the undersigned.

Dated this 13th day of February 2009.

Respectfully submitted,

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